WHAT IS CLAIMED IS:

1. A laser processing apparatus comprising:

a laser oscillator for producing a laser beam for selectively removing part of a substrate to be processed;

a scanning system for applying said laser beam to an arbitrary position of said substrate; and

incident means for applying said laser beam to said substrate substantially at right angle.

2. The laser processing apparatus according to claim 1 further including:

liquid supply means for supplying a liquid to at least an irradiation region of said substrate by said laser beam; and

a plate transparent to said laser beam disposed on said substrate.

3. The laser processing apparatus according to claim 1, wherein said incident means is a condenser lens disposed between said scanning system and said substrate.

4. The laser processing apparatus according to claim 1 further including a substrate rotation mechanism for rotating said substrate.

5. The laser processing apparatus according to claim 1 further including laser beam shaping means, disposed on an optical path of said laser beam, for changing the size and shape of an optical image of said

laser beam on said substrate corresponding to the rotation of said substrate by said substrate rotating mechanism.

6. The laser processing apparatus according to claim 5, wherein said laser beam shaping means includes a plurality of apertures for shaping said laser beam in a predetermined size and shape.

7. The laser processing apparatus according to claim 5, wherein said laser beam shaping means comprises one or more apertures for shaping said laser beam in a predetermined shape and a lens system for changing the size of said laser beam passing through each of said apertures.

8. The laser processing apparatus according to claim 6, wherein said apertures are rotated synchronously with the rotation of said substrate by said substrate rotation mechanism.

9. The laser processing apparatus according to claim 1, wherein said scanning system includes a scanning mirror for scanning two-dimensionally said laser beam for a processing surface of said substrate.

10. The laser processing apparatus according to claim 1 further including:

an optical device provided with fine mirrors arranged corresponding to the size of said laser beam; and

a control unit for controlling a direction of each

of said fine mirrors.

11. The laser processing apparatus according to claim 1, wherein said scanning system includes an acoustic optical device using acoustic optical effect.

12. The laser processing apparatus according to claim 1 further including means for moving said substrate and said scanning system relatively to each other within a two-dimensional plane parallel to a main surface of said substrate.

13. The laser processing apparatus according to claim 1 further including an observation system for detecting a position coordinate of said substrate.

14. The laser processing apparatus according to claim 1 further including means for controlling irradiation intensity of said laser beam corresponding to an irradiation position of said laser beam for said substrate.

15. The laser processing apparatus according to claim 1 further including:

an optical member for reflecting said laser beam or allowing said laser beam to pass through;

an enclosing member enclosing part or all of said optical member; and

a purge system for supplying a purge gas to said enclosing member.

16. The laser processing apparatus according to claim 2, wherein one of distilled water and organic

solvent having transparency to said laser beam is used as said liquid.

17. The laser processing apparatus according to claim 2, wherein, any one of oxidizing water, reduced water, alkaline water and acid water, in which at least a gas selected from ozone, oxygen, hydrogen, ammonia, carbon dioxide and hydrogen chloride is dissolved, is selected as said liquid.

18. The laser processing apparatus according to claim 2 further including means for applying ultrasonic wave to said liquid.

19. The laser processing apparatus according to claim 2, wherein a plate transparent to said laser beam and provided above said substrate is quartz.

20. The laser processing apparatus according to claim 1 further including a reflection mark provided on said substrate, said laser beam being applied to said mark corresponding to information from an optical device in which a position coordinate of said mark is registered, thereby to remove a film on said mark.

21. A film deposition system comprising:

a carrier station for holding one or more substrates to be processed;

coating film forming means for supplying a coating film forming chemical containing a solvent to a main surface of said substrate to form a coating film on said main surface;

removing said solvent contained in said coating film to form a film on said main surface;

laser processing means for applying an energy beam to said main surface from an energy irradiation device to remove selectively at least part of said film from said main surface; and

carrying means, connected to said carrier station, coating film forming means, coating film forming means and laser processing means, for carrying in and out said substrate.

22. The film deposition system according to claim 21, wherein said laser processing means is incorporated in said coating film forming means.

23. The film deposition system according to claim 21, wherein said laser processing means is provided with liquid supply means for supplying liquid to a surface of said film formed on said main surface and has a function of irradiating said main surface with said energy beam from said energy irradiation device through a thin film having fluidity supplied from said liquid supply means, thereby to selectively remove part of said film from said main surface.

24. The film deposition system according to claim 23 further comprising heating means for removing said liquid supplied from said liquid supply means from said main surface.

25. A pattern forming system comprising:

a carrier station for holding one or more substrate to be processed, said substrate having an alignment mark in a main surface thereof;

first film forming means for forming a first thin film on said main surface;

first coating film forming means for forming a coating film on said first thin film by supplying a coating film forming chemical containing both a sensitive material and a solvent to said main surface;

second coating film forming means for forming a light sensitive thin film by removing said solvent contained in said coating film formed by said first coating film forming means;

laser processing means for selectively removing at least said light sensitive thin film and part of the first thin film formed on said substrate by irradiating said main surface with an energy beam from an energy irradiation device;

latent image forming means for detecting a position of an alignment mark on said main surface, thereby forming a latent image in said light sensitive thin film based on positional information of the detected alignment mark;

light sensitive thin film pattern forming means for forming a light sensitive thin film pattern by applying one of an etching solution and an etching gas to a surface of said light sensitive thin film to

remove at least part of said light sensitive thin film selectively; and

carrying means, connected to said carrier station, said coating thin film forming means, said coating thin film forming means and laser processing means, for carrying said substrate.

26. The pattern forming system according to claim 25, wherein part of said laser processing means is included in said coating film forming means.

27. The pattern forming system according to claim 25, wherein said laser processing means is provided with liquid supplying means for supplying liquid to said first coating film formed on said main surface and has a function of irradiating said first coating film with an energy beam from said energy irradiation device through a fluid film having fluidity supplied from said liquid supplying means to selectively remove at least part of said first coating film on said main surface.

28. The pattern forming system according to claim 27 further including heating means for removing the liquid film supplied from said liquid supplying means from the main surface of said substrate.

29. The pattern forming system according to claim 25, wherein said laser processing means changes laser pulse count and laser output per pulse corresponding to the quantity of laser processing

points and damage limit energy of light sensitive thin film and first thin film so that the laser processing of said substrate is finished within a time to be processed by said latent image forming means.

30. The pattern forming system according to claim 25, wherein said latent image forming means is one selected from a projection type exposure apparatus, an electron beam lithography apparatus, an electron beam exposure apparatus and an X-ray exposure apparatus.

31. The pattern forming system according to claim 25, wherein said latent image forming means is connected to said carrying means.

32. A method of manufacturing a semiconductor device comprising:

forming a first thin film on a main surface of a semiconductor substrate having an alignment mark;

applying a first energy beam to said first thin film provided on a region containing said alignment mark to selectively remove part of said first thin film;

supplying a chemical containing both a light sensitive material and a solvent onto said first thin film to provide a coating film thereon;

removing said solvent contained in said coating film to form a light sensitive thin film;

carrying said semiconductor substrate to latent

image forming means and irradiating said positioning mark with a reference beam through a region in which said first thin film is selectively removed, thereby to recognize a position of said alignment mark;

irradiating a predetermined position on said light sensitive thin film with a second energy beam based on the position of the recognized alignment mark to form a latent image on the light sensitive thin film; and

forming a light sensitive thin film pattern by removing at least part of said light sensitive thin film based on the latent image formed on said light sensitive thin film, wherein

upon irradiating the first energy beam, liquid is supplied to at least a region irradiated with first energy beam.

33. The method according to claim 32, wherein any one selected from distilled water and organic solvent having transparency to the first energy beam is used as said liquid.

34. The method according to claim 32, wherein, any one selected from oxidizing water, reduced water, alkaline water and acid water, in which at least one of ozone, oxygen, hydrogen, ammonia, carbon dioxide and hydrogen chloride is dissolved, is used as said liquid.

35. The method according to claim 32, wherein ultrasonic wave is applied to said liquid.

36. The method according to claim 32, wherein

after part of said first thin film is removed, said semiconductor substrate is heated to remove liquid left on said main surface.

37. The method according to claim 32, wherein said first thin film reduces the intensity of reflection light of said second energy beam reflected by a lower layer of said light sensitive thin film.

38. The method according to claim 32, wherein as light source of said reference light, the same light source as said second energy beam is used.

39. The method according to claim 32, wherein the step of selectively removing part of said light sensitive thin film and the step of forming said light sensitive thin film are executed continuously in the same apparatus and as said liquid, solution soluble with said chemical is employed.

40. The method according to claim 32 further including heating said semiconductor substrate to remove said liquid left on said main surface provided between selectively removing part of said thin film and forming said light sensitive thin film.

41. The method according to claim 32, wherein said semiconductor substrate is heated or exposed to a reduced pressure in the step of removing said solvent from said coating film.

42. A method of manufacturing a semiconductor device comprising:

forming a first thin film on a main surface of a semiconductor substrate having an alignment mark;

supplying a chemical containing a light sensitive material and a solvent to said first thin film to form a coating film on said first thin film;

forming a light sensitive film by removing said solvent contained in said coating film to provide a light sensitive film thereon;

applying a first energy beam to said light sensitive film provided on a region containing said alignment mark, thereby to selectively remove said light sensitive film and part of said first thin film;

recognizing a position of said alignment mark by irradiating said alignment mark with said reference light through the region in which said first thin film is selectively removed;

forming a latent image on said light sensitive film by irradiating a predetermined position of said light sensitive film with a second energy beam based on the position of the recognized alignment mark; and

forming a light sensitive film pattern by selectively removing part of said first thin film based on the latent image formed on said light sensitive film, wherein

upon irradiating said first energy beam, a liquid is supplied to at least a region irradiated with said first energy beam.

43. The method according to claim 42, wherein, any one selected from distilled water and an organic solvent having transparency to said first energy beam is used as said liquid.

44. The method according to claim 42, wherein, any one selected from oxidizing water, reduced water, alkaline water and acid water, in which at least one of ozone, oxygen, hydrogen, ammonia, carbon dioxide and hydrogen chloride is dissolved, is used as said liquid.

45. The method according to claim 42, wherein ultrasonic wave is applied to said liquid.

46. The method according to claim 42, wherein after part of said first thin film is removed, said semiconductor substrate is heated to remove said liquid left on said main surface.

47. The method according to claim 42, wherein said light sensitive film has one selected from absorption and damping characteristics for said second energy beam.

48. The method according to claim 42, wherein said first thin film reduces the intensity of reflection light of said second energy beam reflected by a lower layer of said light sensitive thin film.

49. The method according to claim 42, wherein as light source of said reference light, the same light source as said second energy beam is used.

50. The method according to claim 42, wherein

after a latent image is formed on said light sensitive thin film, at least part of the region in which said first thin film is selectively removed is covered.

51. The method according to claim 42, wherein said semiconductor substrate is heated or exposed to a reduced pressure in the step of removing said solvent from said coating film.

52. A method of manufacturing a semiconductor device comprising:

forming a coating film by supplying a chemical containing a light sensitive material and a solvent onto a main surface of a semiconductor substrate having an alignment mark;

forming a light sensitive thin film on said semiconductor substrate by removing said solvent contained in said coating film;

removing selectively part of said light sensitive thin film by irradiating said light sensitive thin film on a region containing said alignment mark with a first energy beam;

carrying said semiconductor substrate to latent image forming means to irradiate said alignment mark with a reference light through the region in which said light sensitive thin film is selectively removed, thereby recognizing a position of said alignment mark;

forming a latent image on said light sensitive thin film by irradiating a predetermined position of

said light sensitive thin film with a second energy beam based on the position of the recognized alignment mark; and

forming a light sensitive thin film pattern by removing selectively said light sensitive thin film based on the latent image formed in said light sensitive thin film, wherein

upon irradiating said first energy beam, a liquid is supplied to a region irradiated with said first energy beam.

53. The method according to claim 52, wherein, any one selected from distilled water and an organic solvent having transparency to the first energy beam is used as said liquid.

54. The method according to claim 52, wherein, any one selected from oxidizing water, reduced water, alkaline water and acid water, in which at least one of ozone, oxygen, hydrogen, ammonia, carbon dioxide and hydrogen chloride is dissolved, is used as said liquid.

55. The method according to claim 52, wherein ultrasonic wave is applied to said liquid.

56. The method according to claim 52, wherein after part of said coating film is removed, said semiconductor substrate is heated to remove said chemical left on said main surface.

57. The method according to claim 52, wherein said light sensitive thin film has one selected from

absorption and damping characteristics for said second energy beam.

58. The method according to claim 52, wherein as a light source of said reference light, the same light source as said second energy beam is used.

59. The method according to claim 52, wherein after a latent image is formed on said light sensitive thin film, at least part of the region in which said first thin film is selectively removed is covered.

60. The method according to claim 52, wherein said semiconductor substrate is heated or exposed to a reduced pressure in the step of removing said solvent from said film coating.